AF/1742

Docket No.: 49657-742

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	
Katsunori ITOU et al.	:	
Serial No. 09/582,982	:	Art Unit: 1742
Filed: July 10, 2000	:	Examiner: H. Wilkins, III

FOR: ANTIFRICTION BEARING PART FOR HIGH TEMPERATURE

TRANSMITTAL OF APPEAL BRIEF

Commissioner for Patents
Washington, DC 20231

Sir:

Submitted herewith in triplicate is Appellant(s) Appeal Brief in support of the Notice of Appeal filed December 12, 2002. Please charge the Appeal Brief fee of $320.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Date: February 12, 2003

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02/25/03

APPEAL BRIEF

Commissioner for Patents
Washington, DC 20231

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed December 12, 2002.

I. REAL PARTY IN INTEREST

The real parties in interest are NTN CORPORATION and DAIDO STEEL COMPANY, LTD.

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II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related Appeal or Interference.

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Adjustment date: 02/14/2003 BABRAHA1
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III. STATUS OF CLAIMS

Claims 1 and 2, all pending claims, have been finally rejected, it is from the final rejection of claims 1 and 2 that this Appeal is taken.

IV. STATUS OF AMENDMENTS

No Amendment has been filed subsequent to the issuance of the Final Office Action dated September 12, 2002.

V. SUMMARY OF THE INVENTION

The present invention is directed to an antifriction bearing part designed for high temperature service, such as for power transmission or an engine part of an automobile or aircraft or ship or an industrial machine which is employed under severe environmental conditions demanding excellent rolling contact fatigue life and reliability (page 1 of the written description of the specification, lines 16 through 20). Prior art carbonitriding treatments are undesirably costly (paragraph bridging pages 1 and 2 of the written description). High temperature tempering treatments adversely impact hardness, rolling contact fatigue life and resistance (page 2 of the written description, lines 13 through 16). In addition, high-temperature tempering performed to ensure high temperature dimensional stability results in this undesirable decomposition of austenite (paragraph bridging pages 2 and 3 of the written description).

The present invention addresses and solves such problems by providing a high temperature antifriction bearing part having an excellent rolling fatigue life in severe environments at a low cost (ultimate paragraph on page 3 of the written description). That objective is achieved by formulating a steel having a specific combination of elements (page 4 of

the written description, lines 2 through 6). Compositional ranges and functions of elements are set forth commencing at page 5 of the written description, line 17 through page 9, line 26. Data appearing in the specification, notably Tables 1, 3 and 4, illustrate unexpected and dramatic superior rolling fatigue life at 200°C of steels encompassed by the claimed invention vis-à-vis steels without nickel. The impact of various alloying elements on temper hardness and rolling contact fatigue life shown in Tables 1 and 3 undermine any notion that the arbitrary combination or ingredients from Takada et al. and Ochi et al. necessarily result in a steel having a hardness after tempering at a temperature of 180°C to 350°C of at least HRC 58 and a minimum carbide size not greater than 8 μm as set forth in independent claim 1.

VI. ISSUES

A. The Rejection:

Claims 1 and 2 were rejected under 35 U.S.C. §103 for obviousness predicated upon Takada et al. in view of Ochi et al., the acknowledged prior art and "High Carbon Chromium Bearing Steels" (JIS).

B. The Issue Which Arises In This Appeal and Requires Resolution by the Honorable Board of Patent Appeals and Interferences (the Board) is:

Whether claims 1 and 2 are unpatentable under 35 U.S.C. §103 for obviousness predicated upon Takada et al. in view of Ochi et al., the acknowledged prior art and JIS.

VII. GROUPING OF CLAIMS

The appealed claims stand or fall together as a group with independent claim 1.

VIII. THE ARGUMENT

The Examiner's Rationale

The Examiner's tortuous road to the obviousness conclusion bridges factual lacunas with legal error. Bearing in mind the absence of any factual basis upon which to predicate the conclusion that one having ordinary skill in the art would have realistically considered the steel disclosed by either Takada et al. or Ochi et al. a high temperature bearing steel, the Examiner begins with an admission that the steel disclosed by Takada et al. does not contain nickel. The Examiner concludes that one having ordinary skill in the art would have been motivated to incorporate nickel in the steel disclosed by Takada et al. in view of Ochi et al. **Still not there**, the Examiner concluded that one having ordinary skill in the art would have been motivated to heat treat the resulting steel, after adding nickel, at an elevated temperature. The basis for this conclusion is a perceived admission at page 2 of the written description of the specification, lines 7 through 12. **Still not there**, the Examiner selects a steel from JIS, says its similar to that disclosed by Takada et al. after adding nickel, and then says that one having ordinary skill in the art would have expected that modified steel of Takada et al. to exhibit properties similar to that picked out of JIS. It is only after all of these pieces are thrown into the stew that the Examiner finally retreats to the doctrine of inherency. In other words, the Examiner's legally erroneous approach is that **if** the right composition is selected in the right amounts from the disclosure of Takada et al., and **if** nickel is added in the right amount, and **if** the resulting steel is processed as though it was a high temperature steel (which has yet to be factually established), **then** the

claimed invention would result, i.e., the steel would exhibit the properties recited in independent claim 1. Appellants submit that the Examiner's rejection is factually and legally erroneous on its face.

Insufficient Facts

The Examiner has failed to factually establish that:

1. the steel disclosed by Takada et al. is, and would have been recognized by one having ordinary skill in the art as, designed for high temperature service;

2. the steel disclosed by Ochi et al. is, and would have been recognized by one having ordinary skill in the art as, suitable for high temperature service; and

3. the SUJ2 steel selected by the Examiner from JIS is similar to the steel disclosed by Takada et al. Underscoring the third enumerated factual deficiency, Appellants note that the SUJ2 steel does not contain the amounts of copper, nickel or aluminum disclosed by Takada et al.

As a **factual matter**, neither the primary reference to Takada et al. nor the secondary reference to Ochi et al. discloses a bearing steel **designed for high temperature service.** How then does the Examiner arrive at the claimed invention?

There is no Motivation

The Examiner failed to make a "thorough and searching" factual inquiry and, based upon that factual inquiry, explain **why** one having ordinary skill in the art would have been realistically impelled to combine applied references to arrive at the claimed invention. *In re Lee, 237 F.3d 1338, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).*

The Examiner has failed to provide any **factual basis** to support the assertion that one having ordinary skill in the art would have recognized that the steels disclosed by Takata et al. and Ochi et al. are bearing steels **designed for use at high temperatures**, i.e., exhibit a long life under high temperature conditions. Ergo, even **if** the steels disclosed by Takata et al. and Ochi et al. were intermixed, as though one having ordinary skill in the art would have arbitrarily mixed elements from hundreds of thousands of steel compositions, one having ordinary skill in the art would **still not have been realistically motivated** to heat treat that steel at elevated temperatures, as in the claimed invention. *In re Lee, supra.* Again, the Examiner has **not factually** established the realistic motivation to heat treat the steels of Takata et al. or Ochi et al. at an elevated temperature as is the claimed invention.

The Examiner's Response

In the third enumerated paragraph on page 3 of the September 12, 2002 Final Office Action, the Examiner asserts that Appellants admitted on page 2, lines 7 through 12, it was known perform high temperature tempering on high temperature using bearing steels, such as SUJ2.

Appellants' Response

Of course it was conventional to subject known high temperature bearing steels to high temperature treatment for dimensional stability. But what has that got to do with the steel of the primary reference to Takada et al., or the steel resulting from selectively adding nickel thereto? **What** is the **factual** basis for concluding that one having ordinary skill in the art would have recognized that the steel disclosed by Takada et al., or that fabricated by the Examiner after

incorporating nickel, is a high temperature bearing steel? The Examiner says that is very similar to SUJ2 in the fourth full paragraph on page 3 of the September 12, 2002 Final Office Action. Saying so does not make it so. There are thousands of steels which can be said to be similar. The issue, however, is whether one having ordinary skill in the art would recognized that the steel disclosed by Takada et al., even after adding nickel, is designed for high temperature service. The Examiner has failed to make the requisite "thorough and searching" factual inquiry to establish that one having ordinary skill in the art would have recognized the steel disclosed by Takada et al. is suitable for high temperature use. As far as the asserted similarity to SUJ2, Appellants would again note the differences in the amounts of copper, nickel and aluminum between the steel disclosed by Takada et al. and SUJ2.

Appellants would note that the conventional steel, such as the SUJ steel must be treated with a high temperature tempering process for dimensional stability, thereby reducing surface hardness and leading to decomposition of the retained austenite on the surface. The reduced surface hardness decreases the rolling contact fatigue life of the roller bearing, and that decreased amount of austenite does not relieve stress concentration in an environment contaminated by foreign matter.

The conventional steel treated with a high temperature tempering process may be employed in an environment without loading, even at a high temperature. The conventional steel, such as SUJ2, however, cannot attain a satisfactory life in the field of power transmission devices targeted by the present invention, such as automobiles or aircraft, which are exposed to high temperature, foreign matter and heavy load. In accordance with the present invention, an alloy is formulated by adding a specified amount of nickel in order to suppress the reduced hardness and the composition of retained austenite at a high temperature. Such factors are not

even on the radar screen of the applied prior art.

Further Structural Differences

Claim 1 specifies that the maximum carbide size is not more than 8 μm. The Examiner points to Table 2 of Takada et al. asserting the disclosure of an Example of the non-metallic inclusions having an average size or not more than 1.0μm, which are formed of impurities, such as oxide or sulfides, but not carbides. In this respect, Appellants would note that the non-metallic inclusions defined by JIS include System A: inclusions with viscous deformation by working, such as sulfide or silicide, System B: granular inclusions forming a group in a working direction and making a line discontinuously (such as alumina); and System C: inclusions dispersed irregularly without viscous deformation (such as granular oxide). The carbide is used with its dimension and amount controlled by an alloy element or heat treatment, and is totally different from the impurity such as oxide. Accordingly, as a **factual matter**, Takata et al. neither disclose nor suggest the dimension of the carbide, particularly with respect to the relation between the grain size of the carbide and the rolling contact fatigue life.

Appellants would note that the abnormal structure caused by repeated heavy loading is explained in "Rolling Bearing Analysis" (Wiley-Interscience 2001 Fourth Edition), Tedric A. Harris, ISBNO-471-35457-0, which is a prominent book in the field of bearings. This structure is termed "butterfly." A copy of the relevant pages (841-843) are pended hereto as Exhibit A for the convenience of the Honorable Board.

Further Evidence of Lack of Motivation

One of the principal differences between the claimed invention and the steel disclosed by Takata et al. is in the **nickel content**. Takata et al. does **not** require nickel. It should be noted

that Sample G of Takata et al. merely contains an **impurity** amount of nickel. As Takata et al. clearly regard nickel as an impurity, it can not properly be concluded that one having ordinary skill in the art would have been realistically led to proceed **against the teachings** of Takata et al. by incorporating nickel therein. *In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992); In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); In re Schulpen, 390 F.2d 1009, 157 USPQ 52 (CCPA 1968).*

Moreover, it should be apparent from Tables 3 and 4 of the written description of the specification, that the rolling fatigue life and foreign matter rolling life **at 200°C** of steel Samples, M, NO, P, to which nickel is not added, are clearly **lower** than those of inventive Examples A through L, to which nickel is added. This **high temperature** effect is **dramatic** and **unexpected**, and should, be given consideration. Indeed, the unexpected nature of such a dramatic effect is apparent as neither Takata et al. nor Ochi et al. disclose any steels which one having ordinary skill in the art would have recognized as a bearing steel designed for **high temperature use**. Suffice it to say, Ochi et al. are not concerned with high temperature bearing steels and, therefore, could not have predicted such dramatic results at **200°C.**

Ochi et al. do disclose the presence of nickel. However, in accordance with the teachings of Ochi et al., nickel is added to improve quench-hardenability and to suppress white structures and production of carbide. In other words, Ochi et al. are concerned with a different problem, i.e., abnormal structures that occur for high-loading surface. One having ordinary skill in the art is aware that repeatedly heavy loading causes white abnormal structures on the surface layer.

However, in accordance with the present invention, nickel is added to prevent deformation for high temperature use and resists high temperature tempering to prevent a reduction in hardness while suppressing structural change. Thus, one having ordinary skill in the

art would not have understood from Ochi et al. that nickel improves hardness.

The Examiner's Legally Erroneous Reliance Upon Inherency

The Examiner committed **clear legal error** by falling back on an inherency theory in the context of the imposed under 35 U.S.C. §103 for obviousness. The Examiner's invocation of the doctrine of inherency appears to be predicated upon the theory that **if** the proper amount of ingredients of the steel disclosed by Takata et al. are selected, **if** that steel is modified by incorporating the right amount of nickel, and further **if**, the resulting steel is heat treated at a sufficiently high temperature for a sufficient time, **then** the claimed invention would result. In other words, pick the right ingredients, heat at the right temperature, following the blueprint of the Appellants' disclosure, an the invention results. This approach is legally erroneous for at least two reasons.

Firstly, in order to invoke the doctrine of inherency, the Examiner must **factually** establish that the allegedly inherent properties **necessarily**, flow from the teachings of the applied prior art and that one having ordinary skill in the art would **have recognized such properties**. *Elan Pharmaceuticals Inc. v. Mayo Foundation, ___ F.3d ___, 64 USPQ2d 1292, (Fed. Cir. 2002); Crown Operations, International, Ltd. v. Solutia Inc., __F.3d__, 62 USPQ2d 1917(Fed. Cir. 2002); Finnegan Corp. v. ITC, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999).* Clearly, since each alloying element must be selected in the right amount to achieve the properties recited in the claims, and the right heat treating temperature must be employed, it is legally erroneous to conclude that the recited properties would **necessarily** result from the teachings of the applied prior art.

Moreover, the Examiner's agglomeration of "**ifs**" necessary to support the rejection underscores legal error. Specifically, the Examiner's approach is that **if** the right amount of ingredients of the steel disclosed by Takata et al. are selected, and **if** nickel is added in the right amount, and then **if** one skilled in the art would have recognized that the resulting steel is suitable for high temperature use, and that has not been established by facts, and then **if** the fortuitously formulated steel is tempered under the right conditions, **then** maybe the claimed invention would result. This approach has been repeatedly judicially condemned as **confusing obviousness with inherency**. *In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); In re Shetty, 566 F.2d 81, 195 USPQ 753 (CCPA 1977); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); In re Naylor, 369 F.2d 765, 152 USPQ 106 (CCPA 1966); In re Spormann, 363 F.2d 444, 150 USPQ 449 (CCPA 1966); In re Henderson, 348 F.2d 550, 146 USPQ 372 (CCPA 1965).*

Appellants would refer to *Ex parte Schriker, 56 USPQ2d 1723, 1725 (BPAI 2000);* wherein the Honorable Board of Patent Appeals and Interferences stated:

> Inherency and obviousness are somewhat like oil and water- they do not mix well.

Ergo, the Examiner's reliance upon the doctrine of inherency is **legally erroneous**.

Evidence of Nonobviousess

It is **legally erroneous** to ignore, as the Examiner has done, any evidence impacting **nonobviousness**. *Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988); Stratoflex Inc. v. Aeroquip Corp., 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); In re Murch, 464 F.2d 1051, 175 USPQ 89 (CCPA 1972).* That legal tenet applies to evidence in the specification. *In re Glaug, __F.3d__, 61 USPQ2d 1151 (Fed. Cir. 2002); In re Soni, 54 F.3d*

746, 34 USPQ2d 1685 (Fed. Cir. 1995); In re Margolis, 785 F.2d 1029, 228 USPQ 940 (Fed. Cir. 1986). It is apparent from Tables 3 and 4 that the **rolling** fatigue life and foreign matter rolling life at **200°C** of steels containing nickel are clearly **unexpectedly and dramatically superior** to those that do not contain nickel. That this is unexpected is underscored by the fact that the Examiner has **not** identified a factual basis to support the conclusion that one having ordinary skill in the art would have recognized that the steel disclosed by Takata et al., or the steel disclosed by Ochi et al., or some phantom steel resulting from blending alloying elements from these steels, is intended for high temperature bearing use.

It should be apparent from Tables 1 and 3 that elements such as nickel, sulfur, phosphorous, maganese, carbon, molybdenum, vanadium as well as trace amounts of aluminum, titanium, oxygen and nitrogen, affect the temper hardness and **high temperature rolling contact fatigue life**. Such evidence further scotches any notion that somehow the combined disclosures of Takata et al. and Ochi et al. would result in a steel which **necessarily**, repeat **necessarily**, exhibits a hardness after tempering at a temperature of 180°C to about 350°C of at least HRC 58 and a maximum carbide size not greater than 8 μm.

Another potent indicum of **nonobivousness**, which the Examiner persists in erroneously ignoring, is the **problem** addressed and solved by the claimed invention which must be given consideration anent the **nonobviousness** issue. *North American Vaccine, Inc. v. American Cyanamid Co., 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); In re Newell, supra; In re Nomiya, 509 F.2d 566, 184 USPQ 607 (CCPA 1975.* As argued throughout prosecution of this application, the present invention addresses and solves problems with bearings at **high temperatures**. As Takata et al. and Ochi et al. neither disclose nor suggest bearings **for high**

temperature service, the problems addressed and solved by the claimed invention are **alien to these references**.

Specifically, high temperature tempering is performed to ensure dimensional stability. However, high temperature tempering disadvantageously generates problems, such as lower hardness and shortening of bearing life. Again, these problems do not even exist in the steels disclosed by Takata et al. or Ochi et al. However, in accordance with the present invention, such problems are addressed and solved by strategically formulating the steel composition and employing certain processing conditions, thereby enabling the fabrication of a high temperature bearing part exhibiting high dimensional stability and sufficient hardness. In other words, the claimed invention achieves a combination of conflicting objectives which are not even on the radar screen of Takata et al. or Ochi et al. Under such circumstances, the problem addressed and solved by the claimed invention constitutes **compelling objective evidence of nonobviousness.**

Conclusion

It should, therefore, be apparent that the Examiner has failed to establish a prima facie case of obviousness under 35 U.S.C. §103 for lack of the requisite actual basis and want of the requisite motivation. Further, upon giving due consideration to the problem addressed and solved by the claimed invention as an indicium of nonobviousness, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. §103. *Jones v. Hardy, 727 F.2d 1524, 220 USPQ 1021 (Fed. Cir. 1984).*

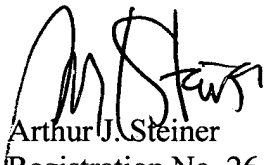
IX. PRAYER FOR RELIEF

Based upon the foregoing, Appellant submits that the Examiner's rejection of claims 1 and 2 under 35 U.S.C. §103 is legally erroneous. Appellants, therefore, respectfully solicit the Honorable Board to reverse the Examiner's rejection under 35 U.S.C. §103.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY



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APPENDIX

1. (Thrice Amended) A part of an antifriction bearing for a high temperature having an inner ring, an outer ring and a rolling element,

consisting of a steel product containing C by at least 0.8% and not more than 1.3%, Si by at least 0.3% and not more than 3.0%, Mn by at least 0.2% and not more than 1.5%, P by not more than 0.03%, S by not more than 0.03%, Cr by at least 0.3% and not more than 5.0%, Ni by at least 0.53% and not more than 3.0%, Al by not more than 0.050%, Ti by not more than 0.003%, O by not more 0.0015% and N by not more than 0.015% in mass % as the contents of alloying elements with the rest consisting of Fe and unavoidable impurities and having a structure subjected to tempering after quench hardening or carbonitriding, wherein the hardness after said tempering is at least HRC 58, when tempered at a temperature in a range of 180°C to 350°C, and the maximum carbide size is not more than 8 μm.

2. The antifriction bearing part for a high temperature according to claim 1, wherein said steel product further contains at least one of at least 0.05 % and less than 0.25 % of Mo and at least 0.05 % and not more than 1.0 % of V in mass %.